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Meningococcal Purpura Fulminans: Treatment of Vascular Insufficiency in a 2-Yr-Old Child with Lumbar Epidural Sympathetic Blockade

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Systemic meningococcal infection (meningococcemia) is frequently associated with fulminant purpura, shock, and disseminated intravascular coagulation. Disseminated intravascular coagulation with arterial occlusion may result in inadequate oxygen delivery to tissues, and subsequently, gangrene. It is possible that in patients with intravascular coagulation, the vascular insufficiency is partly due to direct vessel occlusion, but a component may also be due to release of mediator substances with associated vasoconstriction.[1] Thus, with localized vascular insufficiency in disseminated intravascular coagulation, regional sympathetic blockade may increase microvascular perfusion.

We describe a 2-yr-old child who was successfully treated for vascular insufficiency of the lower extremities using continuous lumbar epidural blockade to provide regional sympathetic blockade.

REPORT OF A CASE

A 2-yr-old child was admitted with clinical signs of septic shock, disseminated intravascular coagulation, and diffuse purpura. Meningococcemia was documented by positive blood and CSF cultures. She required dopamine, 5–20 $\mu g \cdot kg^{-1} \cdot min^{-1}$ for circulatory support for 3 days; vasopressor requirements diminished greatly early on hospital day 3. Later, on the third hospital day, perfusion of her lower extremities deteriorated (fig. 1). Dorsalis pedis and posterior tibial pulses were not detectable by palpation or by Doppler ultrasound examination. At the suggestion of a microvascular/plastic surgeon, pain service consultation was obtained to consider institution of regional sympathetic blockade. At this time, coagulation indices were normal.

After obtaining parental consent, a 21-G epidural catheter was advanced through a 19-G 1½-inch Scott-Touhy needle at the L2–L3 interspace using a loss of resistance technique. An infusion of 0.5% lidocaine was begun at 1.1 $mg \cdot kg^{-1} \cdot hr^{-1}$. Within 45 min following the onset of the infusion, there was an increase in the temperature in both feet, and palpable pulses returned bilaterally. This infusion was continued for the next 24 h with an improvement in the perfusion of both feet.

In view of a persistent fever, the catheter was removed on hospital day 8 (1 day following catheter insertion) but was replaced on hospital day 9 due to signs of deteriorating perfusion. No evidence of catheter infection or systemic infection was found. During the next 8 days, continuous epidural infusion of bupivacaine 0.125% (0.2–0.3 $ml \cdot kg^{-1} \cdot hr^{-1}$) was supplemented by bolus injections of bupivacaine 0.25% to provide analgesia for dressing changes and debridement of areas on the patient's right foot and toes. This epidural catheter was removed on hospital day 17. On hospital day 28, the patient underwent latissimus dorsi free muscle grafting to the right foot. An epidural catheter was inserted at this time and bupivacaine 0.125% infusion was employed for 5 days postoperatively both to provide analgesia and in an effort to increase graft blood flow. Epidural bupivacaine injections were employed repeatedly for dressing changes. Grafting of skin and muscle proved to be successful. On follow-up visits 3 months and 12 months later, she was walking well and appeared neurologically intact.

DISCUSSION

The vascular insufficiency observed in this patient's distal lower extremities was attributed to both direct occlusion of vessels by intravascular thrombosis and a degree of secondary vasospasm in response to release of vasoactive mediators. Although it is impossible to discern definitely that the increased perfusion provided by the sympathetic blockade directly resulted in the preservation of her feet (except the distal toes), the temporal association of the sympathetic blockade with immediate recovery of pulses, rapid capillary refill, and a pink appearance, is presumptive evidence that a major contribution was made by epidural sympathetic blockade.

In this patient, alternative methods of providing sympathetic blockade were deemed either impractical or contraindicated. The use of intravenous regional guanethidine was impractical because of: 1) the presence of swelling and hypo-perfusion in both feet, making venous access difficult; 2) concern regarding further vaso-occlusion fol-

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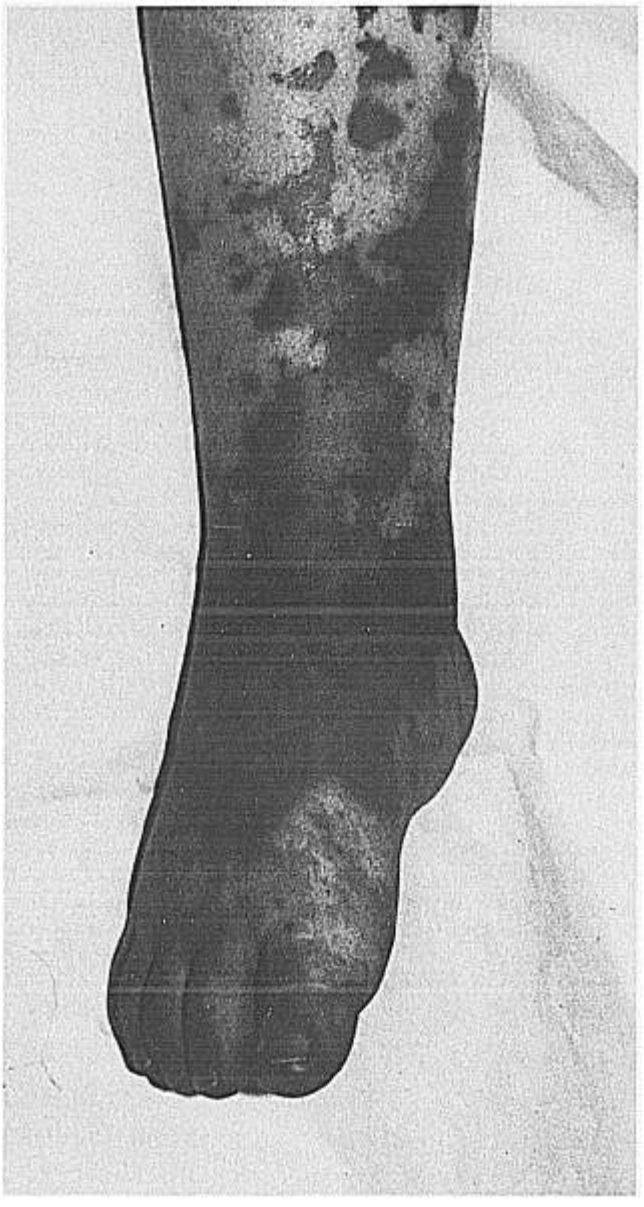

FIG. 1. Photograph of the distal lower-right extremity of the patient on the fourth hospital day, showing diffuse purpura.

lowing use of a tourniquet; and 3) because of the lack of availability of this drug in the pediatric setting. Because the patient was initially and recently hemodynamically unstable, requiring infusion of vasopressors, it appeared unlikely that further vasodilation of the lower extremities could have been achieved with systemic agents (*e.g.*, nitroprusside) without compromising the perfusion to major organs. Continuous paravertebral lumbar sympathetic blockade is used by our group[2] and others[3,4] to treat reflex sympathetic dystrophy of the lower extremities. Although more specific blockade of sympathetic outflow is obtained, in this case, it was convenient to have sensory analgesia as well as sympathetic blockade, and it appeared likely that catheter fixation and testing would be better accomplished with an epidural catheter. An added benefit of this use of epidural blockade was the ability to provide analgesia following procedures involving debridement and grafting. The combined epidural light general anesthetic technique proved effective for the more major procedures, such as the latissimus free muscle flap operation.

In summary, we utilized epidural anesthesia for sympathetic blockade and for analgesia in a child with vascular insufficiency of the lower extremities secondary to meningococcemia. Improved perfusion following sympathetic blockade suggests the usefullness of this technique in children with decreased lower extremity perfusion in whom the need for analgesia is also present.

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